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10/577,314

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Hiromitsu Nanba

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EXAMINER

GOLIGHTLY, ERIC WAYNE

ART UNIT

PAPER NUMBER

1714

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/577,314	<b>Applicant(s)</b> NANBA ET AL.	
	<b>Examiner</b> Eric Golightly	<b>Art Unit</b> 1714	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 February 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9 and 11-33 is/are pending in the application.
- 4a) Of the above claim(s) 11-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Applicants' amendment filed on 2/5/2010 is acknowledged. Claims 1-9 and 11-33 are pending. Claims 11-33 are withdrawn. Claim 10 is cancelled.

#### ***Claim Objections***

2. Claim 1 is objected to because of the following informalities:

In line 5 of claim 1, the word "the", which is not underlined, has replaced the word "a", which is not shown at all. The word "the" should be underlined and the word "a" should be shown in strike-through or double brackets. MPEP 714(C)(2).

In line 7 of claim 1, the phrase "in a substantially horizontal state" has been deleted (in the prior listing of claims, this phrase appeared immediately after the word "substrate" in line 3). The phrase "in a substantially horizontal state" should be shown in strike-through or double brackets.

In claim 1, the word "step" should be deleted in the phrase "rinse process step" in line 10 and in the phrase "reducing of the feed amount step" in line 14, since "step" is not used immediately after the phrase "rinse process" in line 5 and immediately after the phrase "reducing a feed amount" line 10.

The phrase "center surface" spanning lines 16 and 17 of claim 1 should apparently be replaced with "surface center".

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicants are advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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6. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0130106 to Mertens et al. (hereinafter "Mertens") in view of US 6,058,945 to Fujiyama et al. (hereinafter "Fujiyama").

Regarding claim 1, Mertens teaches a method for cleaning target substrates (abstract) and discloses: holding a target substrate in a substantially horizontal state (Fig. 1, ref. 2 and paragraph [0047]); performing a rinse process on the target substrate by supplying water (paragraph [0040]) onto a surface of the substrate from a water feed point (Fig. 1 ref. 3, incl. ref. 5 and paragraph [0056]) at a center of the surface while rotating the target substrate (Fig. 1, ref. 2 and 3 and paragraphs [0040] and [0056]); and performing a spin dry process on the target substrate (paragraph [0018] by moving the water feed point outward from the surface center (Fig. 1, ref. 3 and paragraph [0056]) while supplying water to form a liquid film outside of the center surface feed point (paragraph [0018]).

Mertens does not explicitly teach: that the water of the rinse process and spin dry process is pure water and using only pure water for the rinse process; continuous with the rinse process reducing a feed amount of the water supplied to the target substrate from the water feed point at the surface center so that the supply is smaller than the supply of water used in the rinse process at the center without stopping the supply of water; and that the target substrate has both hydrophobic and hydrophilic areas.

Fujiyama teaches a substrate cleaning method (abstract) and discloses that a target substrate with both hydrophobic and hydrophilic areas can be effectively cleaned with pure water (col. 22, lines 24-33, hydrophobic areas under hydrophobic oxide layer

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areas and where no oxide later formed). It would have been obvious to one of ordinary skill in the art at the time of the invention to try perform the method as per the Mertens teaching using pure water when the target substrate has both hydrophobic and hydrophilic areas with a reasonable expectation of success since Fujiyama teaches that a target substrate with both hydrophobic and hydrophilic areas can be effectively cleaned with pure water. The skilled artisan would have found it obvious to try using only water during the rinse process with a reasonable expectation of success at least in view of the Mertens/Fujiyama disclosure "for rinsing steps, the rinsing liquid can comprise H<sub>2</sub>O, or a mixture of H<sub>2</sub>O and an acid" (Mertens at paragraph [0040]), which first option suggests using only water. It is noted that the claims do not require using only water during the spin dry process. Further, the skilled artisan would have found it obvious to try, continuous with the rinse process, reducing a feed amount of the water supplied to the target substrate from the water feed point at the surface center so that the supply is smaller than the supply of water used in the rinse process at the center without stopping the supply of water in order to increase the speed of the drying process (Mertens at paragraph [0018]) since there are only three possibilities: make the feed amount smaller, keep it the same, and make the feed amount larger. It is noted that the feature of "reducing a feed amount" is not a clearly separate process from the "rinse process" feature; that is, the "reducing a feed amount" feature can be interpreted as one portion of the "rinse process", which portion supplies less water than another portion of the "rinse process".

Regarding claim 2, Mertens and Fujiyama do not explicitly teach speeds at which the water feed point is moved. However, it can be reasonably expected that a point before the water feed point begins to move outward from a center of the substrate, it is not moving relative to the substrate (see, e.g., Mertens at paragraph [0050]), i.e., its speed is zero. Thus, a speed of moving the water feed point to the substrate outward from the center of the substrate is made faster at an outer peripheral portion of the substrate than at the center portion thereof (faster than zero).

Regarding claims 3 and 4, Mertens and Fujiyama disclose spraying nitrogen gas to the center portion of the substrate (Mertens at Fig. 1, ref. 4 and 5 and paragraphs [0055] and [0056]) and moving the water feed point at a speed of 3 mm/sec (Mertens at paragraph [0055]), but does not explicitly teach: stopping movement of the water feed point when it is separated from the center of the substrate by a predetermined distance, stopping the nitrogen and moving the water feed point again. Since the application of insufficient nitrogen may result in insufficient drying but the application of excess nitrogen may result in waste, the supply or stoppage on nitrogen is a result-effective variable and the skilled artisan would have found it obvious to optimize the supply or stoppage of the nitrogen through routine experimentation, including when the water feed point is 10 to 15 mm separated from the center of the substrate depending, e.g., on the size of the substrate. It is noted that the present claim language does not require that the water feed point be feeding water throughout its movement, i.e., the feed point (such as a nozzle) may be moving but without water flow. Further, the claims do not require

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that the second movement of the feed point necessarily follows the stoppage of the nitrogen, i.e., the nitrogen may be stopped after the feed point begins moving again.

Regarding claim 5, Mertens and Fujiyama disclose the method wherein, after the water feed to the substrate is shifted from the center of the substrate, a nitrogen gas is sprayed to the center to the portion of the substrate (Mertens at Fig. 1 ref, 2, 3, 4 and 5 and paragraphs [0017], [0050] and [0055]), after which a spray point of the nitrogen is moved, together with the water feed point, outward from the center portion of the substrate while spraying nitrogen gas on the substrate (Mertens at paragraph [0056]). It is noted that the claim does not require that there be no nitrogen gas spray before the water feed point is shifted from the center of the substrate.

Regarding claim 6, Mertens and Fujiyama do not explicitly teach stopping the spraying of the nitrogen while moving the spray point of the nitrogen. Since the application of insufficient nitrogen may result in insufficient drying but the application of excess nitrogen may result in waste, the supply or stoppage on nitrogen is a result-effective variable and the skilled artisan would have found it obvious to optimize the supply or stoppage of the nitrogen through routine experimentation.

Regarding claim 7, Mertens and Fujiyama disclose the method wherein a number of rotations of the substrate ranges is at least 100 rpm and less than 2500 rpm (Mertens at paragraph [0056]), but do not explicitly teach that the rinse process is between 100 and 1000 rpm and the spin drying process is between 800 and 2500 rpm. Since an insufficient rotational speed may result in insufficient film distribution and insufficient drying, and an excess speed may result in energy waste, the rotational speed is a



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result-effective variable and the skilled artisan would have found it obvious to optimize the rotational speed through routine experimentation for the rinsing process and the spin drying process.

Regarding claim 8, Mertens and Fujiyama do not explicitly teach the method wherein the number of rotations of the substrate at a time of the spin dry process is set greater than a number of rotations of the substrate at a time of the rinse process. The skilled artisan would have found it obvious to try using a number of rotations of the substrate at a time of the spin dry process which is set greater than a number of rotations of the substrate at a time of the rinse process with a reasonable expectation of success in order to effectively dry the substrate (Mertens at paragraph [0056]) since there are only three possibilities, i.e., spin dry rotations = rinsing rotations, spin dry rotations > rinsing rotations and spin dry rotations < rinsing rotations. It is noted that Mertens discloses a rinsing rotation speed (paragraph [0039] which is lower than a disclosed spin drying speed (Mertens at paragraph [0054]).

Regarding claim 9, Mertens and Fujiyama disclose the method wherein a number of rotations of the substrate ranges is at least 100 rpm and less than 2500 rpm (Mertens at paragraph [0056]), but does not explicitly teach that the rinse process is between 100 and 1000 rpm and the spin drying process is between 1500 and 2500 rpm. Since an insufficient rotational speed may result in insufficient film distribution and insufficient drying, and an excess speed may result in energy waste, the rotational speed is a result-effective variable and the skilled artisan would have found it obvious to optimize

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the rotational speed through routine experimentation for the rinsing process and the spin drying process.

### ***Response to Amendment***

7. The rejections under 35 USC 112, second paragraph, the rejection of claim 10 under 25 USC 103(a) and the double patenting rejections are withdrawn in view of the amendment.

### ***Response to Arguments***

8. Applicants' arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. US 2003/0075204 to de Larios et al. discloses a method for cleaning wafers.

10. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicants are reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric Golightly whose telephone number is (571) 270-3715. The examiner can normally be reached on Monday to Thursday, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Kornakov can be reached on (571) 272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EWG

/Michael Kornakov/

Supervisory Patent Examiner, Art Unit 1714